

REMARKS

Claims 1 and 3-27 are pending in the present application. The rejections under 35 U.S.C. 102 and 35 U.S.C. 103 are respectfully traversed for the reasons stated herein. Applicants believe that the present application is in condition for allowance of which prompt and favorable action is respectfully requested.

35 U.S. C. 102 Rejection

Claims 1, 3-8, 12-27 were rejected under 35 U.S.C. 102(e) as being anticipated by Narasimhan (US 7,016,651). Applicants respectfully traverse this rejection for the reasons stated below. The MPEP recited the standard to be applied in an issue of anticipation under 35 USC 102. Section 2131 of the MPEP states in part:

TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)."

"The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). *See also* MPEP § 2131."

As pointed out by Applicants in the previously submitted Amendment dated May 13, 2009, Applicants respectfully disagree with the assertion that Narasimhan teaches the claim element of detecting or determining received power in an idle sub-carrier frequency band wherein the idle sub-carrier frequency band includes only noise and interference. To further prosecution of the pending claims, in the previously submitted Amendment, Applicants amended the claims to recite the element of "detecting a received power in an idle sub-carrier frequency band, wherein the idle sub-carrier frequency band includes

only noise and interference” in claim 1; the element of “determining an idle sub-carrier frequency band during the symbol period, wherein the idle sub-carrier frequency band includes only noise and interference” in claims 14 and 27; the element of “to determine an idle sub-carrier frequency band during the OFDM symbol period wherein the idle sub-carrier frequency band includes only noise and interference” in claim 15; and the element of “determining an idle sub-carrier frequency band during the OFDM symbol period wherein the idle sub-carrier frequency band includes only noise and interference” in claim 21. These elements explicitly recite that “the idle sub-carrier frequency band includes only noise and interference,” that is, there is no signal present.

As stated in the previously submitted Amendment, the feature of the idle sub-carrier frequency band is found paragraphs 0014, 0043, 0053, 0057-0058 of US2005/0002324 (published version of the -present application). In particular, paragraph 0058 defines the idle sub-carrier to include only noise and interference as recited in the pending claims. Moreover, paragraph 0060 discloses that the detected power of an unassigned sub-carrier either represents aggregate noise and interference for that sub-carrier band or represents detected power of the noise floor if no interfering sources are found in the sub-carrier band. Thus, in either case, the unassigned or idle sub-carrier contains no signal power component, only noise and interference power components.

In contrast, Narasimhan teaches “techniques employ a link interface receiving OFDM symbol(s) from the link, and a signal-to-noise ratio (SNR) estimation unit generating an estimate of a geometric SNR (SNR_{geo}) for the received symbols based on an average of the logarithmic difference between soft decision and hard decisions for the received symbol.” *Narasimhan (US 7,016,651), Abstract.*

The Office Action on page 2 stated that the Abstract of Narasimhan discloses the element of “determining SNR determines power of idle sub-carrier where you determine power of noise in the signal-to-noise ratio.” Applicants respectfully disagree with this characterization of Narasimhan for the following reasons. Narasimhan does not disclose the concept of measuring the signal-to-noise ratio by separately measuring the power of noise in perhaps an idle sub-carrier. And, Narasimhan does not mention the concept of either “an idle sub-carrier” or “an unassigned sub-carrier” in the abstract or in the specification. Thus, the interpretation that Narasimhan determines the power of noise in an idle sub-carrier is unsupported because Narasimhan does not even discuss the concept of an idle sub-carrier.

Narasimhan in Col 8, lines 17-47, which is cited in the Office Action on page 2, states:

“For example, assume in an 802.11a/g OFDM system, a subset of sub-carriers are selected from a set of sub-carriers. If $K=8$, meaning that a subset of 8 sub-carriers are used to estimate $SNR_{geo,n}$ a possible regularly spaced subset could include sub-carriers $\{1, 8, 15, 22, 29, 36, 43, 50\}$ for the n th OFDM symbol in the received frame. Thus, in this case, every 7th sub-carrier is selected for averaging. For the next OFDM symbol $n+1$, this subset could remain the same, or alternatively, a different subset, partially or fully distinct from the previous subset, may be selected, such as $\{2, 9, 16, 23, 30, 37, 44, 51\}$. Of course, this represents only a possible selection strategy to achieve an acceptable SNR_{geo} estimate, either in isolation or over a number of received OFDM symbols or frames, and in fact other selection strategies may be implemented consistent with the present invention as long as a sufficient number of sub-carriers are chosen to provide a representative subset of the symbol constellation. With consideration given to such sub-carrier subset selection, equation (8) becomes:

$$SNR_{geo, n, dB} \approx A \cdot \mathbb{E} \left[-20 \log_{10} \left\| \frac{Y_{n,d}}{H'_{k,k}} - K_{geo,d}^c P_{n,k} \right\|^2 \right] \quad (9)$$

$$k = k_0, k_1, \dots, k_{K-1}, K \leq N.$$

This relationship can be conveniently implemented by the SNR estimation unit 235 shown in FIG. 2 to provide an SNR estimate, and consequently a measure of signal quality 5Q on a per received OFDM symbol basis.”

As shown in the quotation, what Narasimhan teaches is SNR estimation, that is, signal-to-noise ratio. This is in contrast to the pending claims which recites an “idle sub-carrier frequency band” and which defines that the “idle sub-carrier frequency band includes only noise and interference” void of a signal component.

More specifically, Narasimhan explicitly teaches an SNR estimation technique in his equation (7) as a function of soft decision outputs $X'_{n,k}$ and hard decision outputs $D_{n,k}$. It is known by one skilled in the art that soft decision outputs are produced by a symbol detector with a multiple bit output when a digital signal is present at the input. Similarly, hard decision outputs are produced by a symbol detector with a single bit output when a digital signal is present at the input. To put it another way, if there is only noise (i.e., void of signal), there would be no need for a decision (either a soft decision or a hard decision) to be made. In Narasimhan, the term “symbol” represents a signal.

In either the soft decision or hard decision case, a signal (in addition to noise and interference) is presented to the symbol detector to make a definitive decision on the digital state of the signal (e.g., a zero state or a one state). For example, this notion can be seen by examining the assumptions stated in Narasimhan in Col. 7, lines 7-27 where a transmitted symbol (i.e. signal) X_k is explicitly postulated in the formulation of equations (4) and (5). In equation (4) the signal component is represented by X_k . This signal component is then approximated by the $K_{mod}D_{n,k}$ term in equation (5).

Moreover, as Narasimhan provides further simplifications to his SNR estimation through equations (7) through (9) with each equation preserving the term $K_{mod}D_{n,k}$, and

thus, the estimated SNR again depends on a function of soft decisions and hard decisions of a postulated signal. That is, Narasimhan discloses the estimation of SNR using soft decisions and hard decisions across a plurality of sub-carriers. Narasimhan states this explicitly in the Abstract “Techniques for measuring signal quality in a communications link supporting OFDM symbol transfer across plural sub-carriers are disclosed.” To characterize that Narasimhan discloses power estimation of an idle sub-carrier frequency band (i.e. without a signal present) is contrary to what Narasimhan explicitly states.

Thus, for the reasons stated above, Narasimhan fails to teach the elements of the claims and no *prima face* case of anticipation can be supported. And, withdrawal of the 35 U.S.C. 102 rejection is respectfully requested.

35 U.S.C. 103 Rejection

Dependent claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Narasimhan (US 7,016,651) in view of Vella-Coleiro (US 7,197,085). Dependent claim 10 was rejected under 35 U.S.C. 103(a) as being unpatentable over Narasimhan (US 7,016,651) in view of Jones et al. (US 6,757,241). Dependent claim 11 was rejected under 35 U.S.C. 103(a) as being unpatentable over Narasimhan (US 7,016,651) in view of Jones et al. (US 6,757,241) and further in view of Crawford (US 6,549,561).

The MPEP recited the standard to be applied in an issue of obviousness under 35 USC 103. Section 2143.03 of the MPEP states in part:

ALL CLAIM LIMITATIONS MUST BE CONSIDERED

"All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

The factual inquiries that are relevant in the determination of obviousness are determining the scope and contents of the prior art, ascertaining the differences between the prior art and the claims in issue, resolving the level of ordinary skill in the art, and evaluating evidence of secondary consideration. KSR Int'l Co. v. Teleflex Inc., 550 U.S. ___, 2007 U.S. LEXIS 4745, at **4-5 (2007) (citing Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17-18 (1966)). To establish a *prima facie* case of obviousness, the prior art references “must teach or suggest all the claim limitations.” M.P.E.P. § 2142. Moreover, the analysis in support of an obviousness rejection “should be made explicit.” KSR, 2007 U.S. LEXIS 4745, at **37. “[R]jections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” Id. (citing In re Kahn, 441 F.3d 977, 988 (Fed. Cir. 2006)).

Dependent claims 9, 10 and 11 each depend from independent claim 1, and as such, each also recites the elements of claim 1. The cited secondary references (Vella-Coleiro, Jones and Crawford), however, do not make up for the deficiency of Narasimhan.

As stated on page 8 of the Office Action, Vella-Coleiro is cited for disclosing “determining a sum of a square of a quadrature component with a square of an in-phase component.” On page 9 of the Office Action, Jones is cited for disclosing “to store the detected receive power as a noise plus interference estimate if the sub-carrier frequency is being used and only storing noise if the sub-carrier frequency band is not used since in the absence of interference only noise is present.” And, on page 10 of the Office Action,

Crawford is cited for disclosing “synchronizing a time reference with a transmitter transmitting the OFDM symbols.”

Thus, assuming we take the characterization of the cited secondary references for what are stated above, the cited secondary references, either taken separately or in combination with each other or with Narasimhan, do not disclose, teach, suggest or make obvious all of the features of dependent claims 9, 10 and 11, and the 103 rejection should be withdrawn accordingly.

CONCLUSION

For the reasons stated above, the prior art references cited by the Examiner do not anticipate or teach, suggest or make obvious the pending claims 1 and 3-27. Thus, Applicants respectfully request withdrawal of the 35 U.S.C. 102 and 35 U.S.C.103 rejections based thereon.

REQUEST FOR ALLOWANCE

In view of the foregoing, Applicants submit that all pending claims in the application are patentable. Accordingly, reconsideration and allowance of this application are earnestly solicited. The Commissioner is authorized to charge Deposit Account No. 17-0026 for the fees owed for the Request for Continued Examination (RCE). Applicants do not believe that any other fees are due regarding this Response.


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However, if any other fees are required, please charge Deposit Account No. 17-0026.

Applicants encourage the Examiner to telephone the Applicants' attorney should any issues remain.

Respectfully submitted,

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